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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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CHEVRON SERVICES COMPANY
LAW, INTELLECTUAL PROPERTY GROUP
P.O. BOX 4368
HOUSTON, TX 77210-4368

EXAMINER

HANDAL, KAITLY V

ART UNIT	PAPER NUMBER
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1764

MAIL DATE	DELIVERY MODE
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/006,963

Applicant(s)

KRAUSE ET AL.

Examiner.

Kaity Handal

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 18-19 are rejected under U.S.C. 102(b) as being anticipated by Abe et al. (U.S Pat. No. 6,576,203 B2).

With respect to claim 19, Abe et al. teaches an apparatus for converting hydrocarbon fuel into a hydrogen rich gas (fig. 3), comprising at least four modules (61 & 62) (col. 5, lines 19-21) stacked end-to-end along a common axis, wherein each module of the plurality of modules includes: a shell (63) having an interior space defining a passageway for the flow of a gas stream from a first end (65) of the shell to a second end (63) of the shell (63) opposite the first end (65), and a processing core being contained within the interior space for effecting a chemical, thermal, or physical change to the gas stream passing axially through (col. 8, lines 27-34) wherein the plurality of modules which includes pellets made of an inert material (col.11, lines 10-

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25), wherein the inert material is not a catalyst, an adsorbent, an absorbent, or a heat exchanger; in Abe however, the inert material acts as a catalyst carrier.

Abe teaches a module with an inlet (65) introducing reactive fluid (A) (col. 8, line 32). Water being material worked upon, it does not limit the apparatus claims. MPEP 2115.

With respect to claim 18, Abe teaches an inert material comprising ceramic beads (col. 11, lines 10-16).

3. Claims 4, 8-14, and 20-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Gonjo (US 6,159,434).

With respect to claim 8, Gonjo teaches an apparatus for converting hydrocarbon fuel into a hydrogen rich gas (fig. 1 A), comprising a plurality of modules/flat plates (col. 5, lines 15-22) or portions (as illustrated in fig. 1A) stacked end-to-end along a common axis; wherein each module/portion of the plurality of modules includes: a shell in the form of an annular layer of thermally insulative material disposed around the respective processing core (col. 29, lines 15-16) having an interior space defining a passageway for the flow of a gas stream from a first end (1) of the shell to a second end/catalytic combustion portion (lower) (6b) of the shell opposite the first end, and a processing core being contained within the interior space for effecting a chemical, thermal, or physical change to the gas stream passing axially there through wherein the plurality of modules/portions includes a first module (Fig. 1A, 6a & 4 & 6b), wherein the processing core of the first module/portion (6a & 4 & 6b) includes a

partial oxidation catalyst bed/catalytic combustion portion (6a). Gonjo's catalytic combustion portion contains a combustion catalyst (fig. 12, 36) such as platinum in an alumina carrier, ruthenium, palladium, and rhodium (col. 16, lines 33-35), which are catalysts known to function as partial oxidation catalysts.

With respect to claim 4, Gonjo teaches a plate reformer having a plurality of modules that include an annular layer of thermally insulative material (fig. 9) disposed between the shell and the respective processing core (col. 29, lines 15-18).

With respect to claim 9, Gonjo teaches a reforming apparatus wherein the first module also includes a steam reforming catalyst (fig. 12, 33) inside reforming portion (fig. 1A, 4) which is in between combustion portions (6a) and (6b) (col. 15, lines 39-44).

With respect to claims 10-13, Gonjo teaches a catalyst from a catalyst group consisting of platinum, palladium, rhodium, ruthenium, iridium, nickel, potassium, and combinations thereof; and respective support material consisting of magnesia, alumina, silica, zirconia, and magnesium aluminate (col. 16, lines 33-35).

With respect to claim 20, Gonjo teaches a plate reformer having plurality of modules, one of which has a processing core which includes water gas shift catalyst bed (fig. 11, 38), and a heat exchanger (27) positioned within the water gas shift catalyst bed (col. 19, lines 39-47).

With respect to claim 21, Gonjo teaches a module/shift reaction portion (4a) wherein the processing core includes a low temperature water gas shift catalyst (col. 11, lines 14-16)

With respect to claim 22, Gonjo teaches a low temperature water gas shift catalyst group (col. 11, lines 14-19).

With respect to claim 23, Gonjo teaches a high temperature water gas shift catalyst/shift catalyst (col. 11, lines 14-19).

With respect to claim 24, Gonjo teaches wherein the high temperature water gas shift catalyst includes a material selected from the group consisting of ferric oxide, chromic oxide, and copper (col. 19, lines 43-47).

With respect to claims 14 and 25, Gonjo teaches a plate reformer having modules, one of which includes a heat exchanger (fig. 1A, 7a) (col. 15, line 22-24).

With respect to claim 26, Gonjo teaches a plate reformer having modules, one of which includes a carbon monoxide oxidation catalyst bed (fig. 13, 5), and a heat exchanger (fig. 4, 27) positioned within the carbon monoxide oxidation catalyst bed (5) (col. 14, lines 3-7).

With respect to claim 27, Gonjo teaches a plate reformer having a carbon monoxide oxidation bed wherein an oxygen/air containing stream is introduced to the reformed gases stream prior to contact with the carbon monoxide oxidation bed (col. 23, lines 28-52).

With respect to claim 28, Gonjo teaches wherein said carbon monoxide oxidation catalyst bed/portion (fig. 1A, 5) includes a material selected from the group consisting of platinum, palladium, iron, chromium, manganese, iron oxide, chromium oxide, manganese oxide, ruthenium, gold and any combination thereof (col. 14, lines 8-10).

Claim Rejections – 35 U.S.C. § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gonjo (US 6,159,434), as applied to claim 8 above, and further in view of Nishida et al. (U.S. Pat. No. 5,387,399).

Gonjo discloses all of the claim limitations as set forth above but Gonjo fails to disclose wherein each module of the plurality of modules includes an annular lip at either the first end or the second end of the shell and an annular recessed portion at the opposite end of the shell, and wherein the annular lip of one module is receivable into the annular recess of the adjacent module.

Nishida teaches a catalytic combustion reactor defined by a cylindrical housing (fig. 1, 3) which contains a plurality of modules (5) (col. 5, lines 52 – 61), wherein each module includes an annular lip at either the first end or the second end of the shell (3) and an annular recessed portion (S) at the opposite end of the shell, and wherein the annular lip of one module is receivable into the annular recess of the adjacent module in order to allow thermal expansion and avoid thermal stress (col. 4, lines 45-50).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in each module an annular lip at either the first end or

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the second end of the shell and an annular recessed portion at the opposite end of the shell, and wherein the annular lip of one module is receivable into the annular recess of the adjacent module in Gonjo's modified apparatus, as taught by Nishida, in order to allow thermal expansion and avoid thermal stress.

6. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable Gonjo (US 6,159,434), as applied to claim 8 above, and further in view of Skala et al. (U.S. Pat. No. 6,238,815 B1).

With respect to claims 5-7, Gonjo discloses all of the claim limitations as set forth above but fails to show a module wherein at least one module includes a porous support member, for example a screen, mounted in proximity to the first and second end of the shell.

Skala teaches an integrated reformer wherein the second reactor module (fig. 3, 46) having a pair (86 and 88) of screen support members mounted in proximity to the first and second end of the shell in order to allow the heat transfer medium to pass through while preventing the catalyst beads from escaping the module.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a pair of screen support members mounted in proximity to the first and second end of the shell, as taught by Skala, in Gonjo's reformer in order to allow the heat transfer medium to pass through while preventing the catalyst beads from escaping the module.

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7. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gonjo (US 6,159,434), as applied to claims 8 and 20 above, and further in view of Clawson et al. (U.S. Pat. No. 6,468,480 B1).

With respect to claims 15-16, Gonjo discloses all of the claim limitations as set forth above but fails to disclose a module wherein the processing core includes a deulfurizing agent which includes zinc oxide.

Clawson teaches a reformer wherein the processing core/sulfur removal zone (71) includes a desulfurizing agent which includes zinc oxide in order to reduce the amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less (col. 4, lines 44-49).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a desulfurizing agent in the processing core of the reformer module, as taught by Clawson, in Gonjo's reactor in order to reduce the amount of hydrogen sulfide in the gas stream to a concentration of about one part per million or less.

Response to Arguments

Prior Art Rejection

Applicant argues that the amendment made to claim 8 more positively recites that the first process step occurs within the first module. Examiner respectfully disagrees. The mere recitation of having a "first module" does not impart further

structural limitation or definition to the module relative to the other modules present in the apparatus. Therefore, Gonjo still reads on the limitations of claim 8.

Applicant argues that the amendment made to claim 19 more positively recites that the inert materials are separate and apart from the catalyst for any purpose. Examiner respectfully points out that Abe still reads on the claim as amended where he teaches having modules containing inert material (col. 11, line 20) in the form of pellets (col. 11, lines 10-13) which is not a catalyst, an adsorbent, an absorbent, or a heat exchanger; in Abe however, the inert material acts as a catalyst carrier.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KH 

9/4/2007



Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700